TABLE 1.—*Free-air temperatures, relative humidities, and vapor pressures during August, 1922.*

TEMPERATURE (°C.).

Altitude, M. S. L. (m.)	Broken Arrow, Okla. (233m.)		Drexel, Nebr. (396m.)		Due West, S. C. (217m.)		Ellendale, N. Dak. (444m.)		Groesbeck, Tex. (141m.)		Royal Center, Ind. (225m.)	
	Mean.	Departure from normal.	Mean.	Departure from normal.	Mean.	Departure from normal.	Mean.	Departure from normal.	Mean.	Departure from normal.	Mean.	Departure from normal.
Surface	25.3	−1.3	22.6	−0.1	24.5	−0.3	23.1	+2.0	27.9	+1.3	22.5	−1.4
250	25.3	−1.2	.....	.....	24.2	−0.2	.....	.....	27.1	+1.4	22.3	−1.4
500	24.8	−0.1	22.0	−0.3	21.8	−0.1	23.0	+2.1	25.8	+1.8	20.0	−1.5
750	23.9	+0.3	21.8	+0.4	20.0	−0.1	22.1	+2.1	24.5	+1.6	18.4	−1.4
1,000	22.7	+0.3	21.1	+0.7	18.5	−0.3	20.8	+2.0	23.1	+1.3	17.0	−1.3
1,250	21.2	+0.3	20.1	+0.9	17.1	−0.3	19.5	+2.1	21.5	+1.0	15.5	−1.3
1,500	19.8	+0.5	18.5	+0.7	15.6	−0.3	18.2	+2.3	19.9	+0.9	14.1	−1.2
2,000	16.6	+0.8	15.4	+0.7	12.5	−0.5	15.3	+2.4	16.5	+0.	11.0	−1.4
2,500	13.4	+0.8	12.5	+1.1	9.6	−0.2	12.7	+2.7	13.2	+0.2	8.4	−1.5
3,000	10.6	+1.0	9.4	+1.5	6.5	−0.4	10.5	+3.3	10.0	−0.2	5.3	−2.0
3,500	7.5	+0.9	5.6	+1.0	2.7	−1.3	8.1	+3.7	10.0	+2.0	2.7	−2.0
4,000	.....	.....	1.9	+0.7	−1.3	−1.9	6.0	+4.6	9.1	+3.5	0.2	−2.0
4,500	.....	.....	−2.1	+0.3	−4.6	−2.4	4.4	+6.2	5.6	+3.5	.....	.....
5,000	.....	.....	−6.4	−0.2	.....	.....	2.4	+7.0	.....	.....	.....	.....

RELATIVE HUMIDITY (%).

Surface	71	+3	74	+5	70	−1	58	−5	66	−9	62	−3
250	70	+2	.....	.....	71	−1	.....	.....	66	−10	62	−3
500	62	−4	71	+5	75	0	57	−5	63	−13	65	0
750	58	−6	62	+1	77	0	54	−4	60	−10	65	−1
1,000	58	−5	58	−1	77	0	53	−4	60	−5	64	−2
1,250	58	−5	56	−2	77	−1	52	−5	62	−1	64	−3
1,500	55	−8	57	0	77	−1	52	−5	65	+2	65	−1

TABLE 1.—*Free-air temperatures, relative humidities, and vapor pressures during August, 1922*—Continued.

RELATIVE HUMIDITY (%)—Continued.

Altitude, M. S. L. (m.)	Broken Arrow, Okla. (233m.)		Drexel, Nebr. (396m.)		Due West, S. C. (217m.)		Ellendale, N. Dak. (444m.)		Groesbeck, Tex. (141m.)		Royal Center, Ind. (225m.)	
	Mean.	Departure from normal.	Mean.	Departure from normal.	Mean.	Departure from normal.	Mean.	Departure from normal.	Mean.	Departure from normal.	Mean.	Departure from normal.
2,000	53	−11	58	+1	77	+2	52	−3	68	+5	67	+4
2,500	53	−9	57	0	73	−3	51	−1	70	+8	68	+10
3,000	49	−10	57	−1	71	−6	47	−3	71	+11	60	+9
3,500	50	−8	62	+5	69	−7	47	+1	63	+8	56	+9
4,000	.....	.....	66	+12	69	−3	45	−0	53	+10	55	+7
4,500	.....	.....	76	+22	63	−7	45	−1	53	+10	.....	.....
5,000	.....	.....	87	+28	.....	.....	.....	.....	.....	.....	.....	.....

VAPOR PRESSURE (*mb.*).

Surface	22.39	−0.84	19.82	+1.26	21.31	−0.65	15.76	+0.45	24.01	−1.76	16.63	−2.32
250	22.18	−0.87	.....	.....	21.03	−0.61	.....	.....	23.21	−1.64	16.52	−2.23
500	19.25	−1.30	18.34	+0.85	18.97	−0.34	15.63	+0.61	20.61	−1.69	15.17	−1.49
750	16.92	−1.37	15.78	+0.27	17.40	−0.38	14.20	+0.71	18.31	−1.08	13.77	−1.43
1,000	15.65	−1.05	14.19	+0.22	15.90	−0.49	12.93	+0.67	16.86	−0.10	12.31	−1.66
1,250	14.31	−0.93	13.00	+0.32	14.65	−0.49	11.83	+0.65	15.92	+0.66	11.38	−1.56
1,500	12.68	−1.12	11.95	+0.45	13.35	−0.36	10.87	+0.76	15.07	+1.00	10.45	−1.25
2,000	10.14	−1.22	9.94	+0.40	10.91	+0.01	9.08	+1.05	13.00	+1.37	8.87	−0.49
2,500	8.25	−0.61	8.00	+0.20	8.39	−0.62	7.57	+1.16	11.17	+1.52	7.56	+0.10
3,000	6.38	−0.50	6.54	+0.13	6.44	−0.89	6.15	+1.03	9.97	+1.93	5.21	−0.42
3,500	5.46	+0.08	5.54	+0.47	4.48	−1.37	5.21	+1.22	8.84	+2.41	4.13	−0.38
4,000	.....	.....	4.48	+0.65	3.20	−1.07	4.41	+1.24	7.69	+3.02	3.46	−0.35
4,500	.....	.....	3.72	+0.82	2.15	−1.34	4.22	+1.66	7.47	+3.02	.....	.....
5,000	.....	.....	2.83	+0.52	.....	.....	.....	.....	.....	.....	.....	.....

TABLE 2.—*Free-air resultant winds (m. p. s.) during August, 1922.*

Altitude, m. s. l. (m.)	Broken Arrow, Okla. (233m.)				Drexel, Nebr. (396m.)				Due West, S. C. (217m.)			
	Mean.		Average.		Mean.		Average.		Mean.		Average.	
	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.
Surface	S. 8° E.	2.7	S. 4° E.	3.5	S. 5° E.	1.9	S. 14° E.	1.6	N. 66° E.	1.5	N. 70° E.	1.0
250	S. 8° E.	2.8	S. 5° E.	3.6	.....	.....	.....	.....	N. 66° E.	1.5	N. 70° E.	0.9
500	S. 6° E.	4.6	S. 5° W.	5.0	S. 10° W.	3.0	S. 7° E.	2.3	N. 46° E.	1.4	N. 42° E.	0.8
750	S. 5° E.	5.4	S. 12° W.	5.7	S. 33° W.	4.0	S. 7° W.	3.3	N. 21° E.	1.3	N. 23° E.	0.8
1,000	S. 7° W.	4.9	S. 23° W.	6.1	S. 48° W.	4.4	S. 24° W.	3.5	N. 38° E.	1.0	N. 29° E.	0.7
1,250	S. 17° W.	4.3	S. 32° W.	5.9	S. 62° W.	4.0	S. 37° W.	3.8	N. 28° E.	1.1	N. 19° W.	0.5
1,500	S. 30° W.	3.7	S. 38° W.	5.6	S. 79° W.	3.7	S. 50° W.	3.9	N. 34° W.	0.8	N. 72° W.	1.4
2,000	S. 44° W.	2.1	S. 45° W.	5.2	N. 86° W.	4.5	S. 66° W.	5.1	N. 37° W.	7.5	N. 68° W.	1.8
2,500	S. 40° W.	1.7	S. 53° W.	5.4	N. 83° W.	5.7	S. 74° W.	6.5	N. 41° W.	2.1	N. 68° W.	3.0
3,000	S. 68° W.	1.3	S. 56° W.	6.8	N. 69° W.	8.6	S. 81° W.	8.3	N. 51° W.	3.3	N. 83° W.	4.7
3,500	N. 66° W.	2.4	S. 48° W.	7.7	N. 68° W.	8.0	S. 81° W.	9.3	N. 56° W.	5.4	N. 88° W.	6.6
4,000	.....	.....	.....	.....	N. 63° W.	11.0	S. 84° W.	10.5	N. 69° W.	10.5	N. 81° W.	7.5
4,500	.....	.....	.....	.....	N. 51° W.	15.7	N. 73° W.	10.2	N. 72° W.	10.5	N. 80° W.	13.0
5,000	.....	.....	.....	.....	N. 45° W.	14.0	N. 81° W.	14.1	.....	.....	.....	.....

Altitude, m. s. l. (m.)	Ellendale, N. Dak. (444m.)				Groesbeck, Tex. (141m.)				Royal Center, Ind. (225m.)			
	Mean.		Average.		Mean.		Average.		Mean.		Average.	
	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.
Surface	S. 61° W.	0.6	S. 31° W.	1.0	S. 6° E.	1.9	S. 17° W.	3.0	S. 77° W.	1.2	S. 61° W.	1.7
250	.....	.....	.....	.....	S. 4° W.	2.6	S. 18° W.	4.1	S. 77° W.	1.4	S. 62° W.	1.8
500	S. 48° W.	0.7	S. 28° W.	1.6	S. 19° W.	3.6	S. 25° W.	6.0	S. 89° W.	3.6	S. 63° W.	3.6
750	S. 51° W.	2.1	S. 30° W.	2.5	S. 12° W.	3.2	S. 23° W.	6.0	N. 85° W.	4.9	S. 68° W.	4.4
1,000	S. 55° W.	2.7	S. 39° W.	2.8	S. 10° W.	2.9	S. 24° W.	5.9	N. 80° W.	5.2	S. 74° W.	5.2
1,250	S. 59° W.	3.1	S. 48° W.	3.1	S. 3° W.	2.3	S. 23° W.	5.7	N. 72° W.	6.8	S. 80° W.	5.9
1,500	S. 69° W.	3.6	S. 59° W.	3.4	S. 7° E.	1.7	S. 21° W.	4.9	N. 74° W.	7.5	S. 84° W.	6.6
2,000	S. 81° W.	5.1	S. 76° W.	4.3	S. 37° E.	1.0	S. 17° W.	4.2	N. 77° W.	8.8	S. 83° W.	7.7
2,500	S. 86° W.	7.1	S. 88° W.	9.2	S. 64° E.	1.7	S. 22° W.	4.3	N. 86° W.	10.6	S. 89° W.	8.9
3,000	N. 87° W.	8.5	N. 86° W.	7.4	N. 22° E.	7.7	S. 32° W.	4.5	N. 83° W.	14.3	N. 87° W.	10.4
3,500	N. 77° W.	10.0	N. 81° W.	9.9	.....	.....	.....	.....	N. 66° W.	6.7	N. 89° W.	10.2
4,000	N. 68° W.	9.4	N. 78° W.	10.2	.....	.....	.....	.....	N. 86° W.	10.0	S. 88° W.	11.7
4,500	N. 45° W.	12.9	N. 81° W.	10.2	.....	.....	.....	.....	.....	.....	.....	.....
5,000	N. 45° W.	14.7	N. 88° W.	12.5	.....	.....	.....	.....	.....	.....	.....	.....

THE WEATHER ELEMENTS.

By P. C. DAY, Meteorologist in Charge of Division.

PRESSURE AND WINDS.

During August the first sign of approaching autumn is noted in the increased strength of the anticyclonic areas that occasionally move from the Canadian Provinces into the northern districts of the United States, particularly to eastward of the Rocky Mountains, as compared with those entering the United States during July. As a result the average atmospheric pressure for August is slightly higher as a rule than that for July over the northern half of the country from the Rocky Mountains eastward. On the other hand, in the southern districts, from Texas eastward, the increasing tendency during August of tropical hurricanes to visit this region, as compared with July, with their attendant low barometric pressure, causes a slight average decrease in pressure from the July values in that region. On the Pacific coast the continued warmth over the land areas, and the further heating of the adjacent ocean cause, on the average, a considerable lowering of the pressure of August from the July values.

During August, 1922, the average pressure was lower than that for the preceding month in nearly all districts, but particularly so over the Gulf States and in the far Northwest.

Compared with the normal the average pressure was higher over most central and southern districts, and also from the Great Lakes eastward, the greatest excesses appearing from the middle Rocky Mountains westward. From the middle Mississippi Valley northwestward into the Canadian Provinces the average pressure was slightly less than normal, and there were small areas along the Atlantic and Gulf coasts with averages likewise less than normal.

The relative position of the high and low pressure areas was in accordance with the condition usually existing during the warmer period of the year, and the resultant

winds were likewise of the normal types, southerly over the Great Plains and Atlantic coast districts, and mainly variable in other portions of the country.

As is usual during the summer months, high winds were mainly of a local character and usually associated with thunderstorms, although on the 24th and 25th high winds occurred over an extensive area from the Dakotas to the Great Lakes, due to the passage eastward of a disturbance of considerable energy near the Canadian boundary.

No important cyclones moved over extensive tracks and such as occurred had mainly little effect upon the general circulation. A list of the more important storms of the month follows at the end of this section.

TEMPERATURE.

The month as a whole was distinctly warm over the great central valleys, and mainly cool over eastern districts, but without marked variations from normal conditions save in a few instances at any period.

The first week had temperatures moderately above normal over much of the country, the main exceptions being a considerable area from the Great Lakes and Ohio Valley northeastward to New England, and the Central Plateau region, where the week was mostly cool.

The second week was very generally cool from the Great Plains eastward, and over most of the Plateau and Pacific Coast States. This week, however, was distinctly warm over the Dakotas and portions of adjacent States, where the averages ranged from 6° to 9° per day above normal, and it was generally warmer than normal over the entire Rocky Mountain region.

The period from the 15th to 22d had generally high temperatures throughout all interior portions of the country, the maximum temperatures rising frequently above 100°, and the average for the period ranging from 6° to 9° above normal over the Great Plains and portions of adjacent regions. On the Pacific coast, and over the Southeastern States this period continued cooler than normal.

The last week of the month was warm in all portions of the country, save from the Ohio Valley and middle Gulf States eastward. In the Great Plains maximum temperatures were again frequently above 100°, particularly in Kansas, Oklahoma, and portions of adjoining States, and the average for the week again ranged from 6° to 9° above the normal over extensive areas between the Mississippi Valley and the Rocky Mountains, and also over portions of the far Northwest. In the more eastern districts the weather remained cool as had been the case for several previous weeks.

Although no records of highest or lowest temperatures for long periods were exceeded during the month, yet on the whole it was the warmest August in many years over the Great Plains and northern Rocky Mountain regions, due in the southern districts to high day temperatures, and in the northern to unusually warm nights. On the other hand, over the southeastern sections, particularly near the coast, it was among the coolest and in some cases the coolest August in the past 50 years or more. This was brought about largely by an unusual number of cloudy, rainy days.

The warmest periods of the month were on the 1st and 2d over the greater part of the Gulf and South Atlantic States, and in the far Northwest; about the 16th to 18th over the Ohio Valley, Great Lakes, and to the eastward; from the 20th to 24th over the Mississippi Valley and Great Plains, where maximum temperatures were mostly well above 100°, rising to an extreme of 118° on the 24th at Oakwood, Okla., the highest ever recorded in that State; in the western Mountain regions the highest temperatures occurred mainly during the last week of the month.

The lowest temperatures of the month occurred on widely scattered dates, but mostly during the last decade. East of the Rocky Mountains the lowest temperatures did not reach the freezing point save in a few instances along the northern border, the lowest recorded, 28° on the 29th, being reported from Meadowlands in northern Minnesota, where slight frost damage occurred. The lowest temperature reported in the whole country, 21°, occurred in the mountains of Wyoming, and a close second, 22°, was reported from a mountain station in Oregon.

PRECIPITATION.

The notable feature of the precipitation during the month was the almost universal deficiency, as compared with the amounts usually received, over the great central valleys and eastern districts. The deficiencies were large over many of the great corn-growing areas, particularly in the States to westward of the Mississippi, and large deficiencies occurred in the East Gulf States also. In the Rocky Mountain States and thence westward to the Pacific precipitation was mainly above the average, particularly in the far Northwest, where a drought of the longest known duration at points in Washington was broken early in the month.

In portions of the middle and southern Plains region the precipitation was wholly insufficient for growing vegetation, and at Oklahoma City it was the least ever observed in August. In portions of eastern New Mexico the drought that had persisted through June and July continued during August, and the summer as a whole was the driest ever known.

Most of the precipitation was the result of thunderstorm activity, and the daily and monthly amounts showed the usual large variation within short distances. In some of the driest sections local areas had sufficient rain, notably in portions of the upper Ohio Valley near Parkersburg, where the heaviest precipitation of record for periods of one and two days occurred.

Precipitation was well distributed during the month, though the amounts were mainly less than normal, over the Atlantic coast districts, particularly from North Carolina to Florida, and rain was frequent in Colorado and adjoining portions of the mountain and Plateau regions.

RELATIVE HUMIDITY.

As may be usually expected, the departures of the relative humidity from normal values roughly outlined the areas of excessive and deficient precipitation. Thus in the great central valleys there was mainly deficient relative humidity, the negative departures ranging up to 15 per cent or more.

From the Rocky Mountains westward, the relative humidity was, on the whole, above normal, the positive departures ranging up to nearly 20 per cent. In this region, however, there were well-marked exceptions, notably in the Great Valley of California, where locally there were large negative departures. Over the Atlantic coast districts the relative humidity was mostly above normal.